CHAPTER 10 ALTERNATIVES SELECTION AND DESIGN MODEL

This section provides documentation of the various alternatives considered during the course of preparation of this DCR. First, the No-Build alternative is described along with the consequences of this course of action. Next, the corridor and alignment alternatives that were identified and evaluated several years ago are documented. These actions lead to the selection and construction of the interim SR 303L roadway that exists today. The selection of the facility type is documented.

The next series of sections deal with selected segments of the proposed roadway project. Each of the system interchanges are addressed separately and then selected service interchanges are addressed. The interim roadway alternatives that were developed in the original IDCR prepared in April 2002 are also described for consideration. In the last section the alternatives considered for the off-site drainage system that was developed through the White Tanks/Loop 303 Area Drainage Master Plan are described.

10.1 NO BUILD ALTERNATIVE

The No Build Alternative represents the minimum transportation improvements for the corridor. The elements of this alternative are as follows:

- The existing interim SR 303L will remain much as it is today
- Bell Road intersection is signalized. Recently MCDOT widening and signalized intersections at Indian School Road, Northern Avenue, Olive Avenue, and Greenway Road. Additional intersections will be widened and signalized as needed. Eventually, all major street crossings of SR 303L between McDowell Road and Bell Road will have this treatment.
- Safety improvements as identified in the SR 303 Safety Study dated March 19, 2004 would be implemented over time. These improvements include construction of passing lanes in selected locations.
- The arterial network of parallel and perpendicular streets will be reconstructed to their planned widths as development occurs in the area.

Historically, the interim SR 303L has functioned as a two-lane rural highway south of Bell Road. The level of service on such a road is governed by the ability to pass another vehicle traveling in the same direction. On this basis, the capacity is limited to approximately 7,900 vpd based upon the Highway Capacity Manual LOS C for two-lane rural roadways.

With the signalization of several intersections, the capacity of existing SR 303L is controlled by these intersections rather than the ability to pass as on a rural road. The daily traffic capacity of this urban two-lane roadway is estimated to be 13,500 vpd based upon the Highway Capacity Manual LOS C for signalized intersections. The average overall travel speed on the roadway is estimated to be approximately 40 to 45 mph with this level of traffic volume.

As the traffic volume exceeds the 13,500 vpd, average speeds will decrease because not all vehicles will clear the intersections with each green phase and slower moving vehicles will have a greater impact on the whole traffic stream because there will be few passing opportunities.

Traffic volumes on the interim SR 303L have grown to between 14,000 and 19,000 vpd thus exceeding the design capacity of the roadway. The rapid development occurring in the corridor area will lead to further rapid traffic growth in the near future.

With continuing increases in traffic volumes, peak-period travel speeds will drop from over 40 mph to less than 30 mph. A trip from Bell Road to McDowell Road took 12 minutes in 2003 prior to the new signal installations. With signals at each mile location, the 12-mile trip is expected to take 18 minutes (a 50% increase in travel time). In the near future, congestion will further decrease the travel speeds so that the 12-mile trip will take almost 30 minutes (2.5 times the time it took earlier in 2004).

The rate of traffic accidents will remain high even though speeds will decrease due to congestion. Increasingly, traffic will divert to other parallel roads including Cotton Lane and Sarival Avenue. These roads currently are low standard rural roads that cannot accommodate high volumes of traffic. The parallel roads are not continuous from Bell to McDowell and are not planned to be continuous arterials.

Through traffic, including truck traffic will go back to using US 60 from SR 303L to SR 101L to enter or pass through the urban area. US 60 is a four lane arterial road with numerous traffic signals. It is planned to be widened in the future to six lanes but the arterial character will remain.

US 60 passes through the three major Sun City retirement communities and provides direct access to commercial property. This roadway is not suited to handle large volumes of through traffic. The mix of through traffic with the retirement community traffic would not be conducive to either type of traffic. The extra noise generated by the higher volumes of traffic on US 60 cannot be effectively mitigated due to frequent cross street intersections.

10.2 CORRIDOR, ALIGNMENT, AND ROADWAY TYPE

Based on prior studies, alternatives for SR 303L have been narrowed. Described below are the corridor, alignment, and the facility type analyses that help define the project as proposed in this DCR.

Corridor Alternatives

The general corridor was identified in the *West Area Transportation Analyses* based on freeway spacing and avoidance of existing urban developments. SR 101L is located just east of 99th Avenue. Minimum freeway spacing is generally considered to be 4 miles. With the complete grid of arterials in the Phoenix Urban Area, the freeways are generally spaced 6 to 10 miles apart. The Agua Fria and New rivers and Luke AFB limit the density of urban development west of SR 101L. Therefore, it appears logical that the next freeway route would be west of Luke AFB and east of the White Tanks Regional Park. The project in the regional setting is shown in Figure 1-2.

Some people have suggested that Sun Valley Parkway be considered as an alternative to the SR 303L corridor. This roadway is located west of the White Tank Mountains 14 miles from the SR 303L corridor location. Sun Valley Parkway will serve development that will eventually occur west of the mountains and there are long term plans to upgrade and extend the road northward to US 60 near SR 74 intersection. When this occurs, some through traffic might choose to use that corridor to reach I-10 instead of US 60 and SR 303L. The Sun Valley Parkway route would be longer and would have no apparent advantage. Since the bulk of the traffic projected to be on SR 303L comes from places other than US 60 at Wickenburg, Sun Valley Parkway is not an alternative.

Some people have also suggested that the proposed CANAMEX corridor be constructed soon instead of upgrading SR 303L. MAG has designated a corridor for the CANAMEX highway that is located 5 miles west of the Sun Valley Parkway along Wickenburg and Vulture Mine roads. This corridor would extend from US 93 north of Wickenburg southward to I-10. Such a route would only serve through traffic. Based on analyses contained in the Final Report for the CANAMEX corridor prepared for ADOT and MAG in August 2000 by Kimley-Horn & Associates, this route would divert very little traffic from the SR 303L corridor because there is very little through traffic. Since this route would be almost 20 miles west of SR 303L, it is clearly a different corridor and cannot be considered an alternative to SR 303L.

On this basis, the SR 303L corridor is defined as being located between Luke AFB and the White Tank Mountains.

Alignment Alternatives

As described above, the SR 303L corridor was identified to be west of Luke AFB because of freeway system spacing criteria, natural constraints, and existing developments.

The first continuous arterial west of Luke AFB is Sarival Avenue. When the alignment studies were performed in the late 1980s and early 1990s, west of Cotton Lane there was a large rural subdivision, a state prison, and an abandoned racetrack. Between Cotton Lane and Sarival Avenue, the area was agricultural. East of Sarival is the Luke AFB runway crash zone. These basic physical constraints lead to the selection of an alignment between Cotton Lane and Sarival Avenue.

In 1987, ADOT began the location studies and EA of the planned route. The *Draft Reconnaissance Report* prepared in February 1987 by Cella Barr & Associates determined the best-fit alignment for the Estrella Freeway from MC 85 to I-17. The proposed alignments avoided conflicts with existing and proposed land development. Other factors that were taken into consideration were compatibility for future extension or connections, impact on public utilities and wells, and cultural resources. In that report, the Estrella Freeway was divided into three sections: Cotton Lane Section, Agua Fria Section, and Northwest Loop Section. In the Cotton Lane Section, which extended from MC 85 to Grand Avenue, eight alternatives were evaluated, designated as A-1 through A-8, respectively. All alignment alternatives were on or between Cotton Lane and Sarival Avenue. Based on these studies, the general alignment selected is on the Cotton Lane section line south of I-10 and on or near the mid-section line north of I-10. The alignment was refined along this general location and documented in the *Estrella Freeway Preliminary Location Plan and Profile* prepared in November 1991 by Cella Barr & Associates.

In 1991, ADOT completed an EA for this planned new route and obtained right-of-way dedications for the route on the basis that a two-lane interim road be constructed within that right-of-way. That road was opened to traffic in 1992. To construct the roadway, irrigation systems were modified, and utilities were relocated to provide a relatively clean corridor for future freeway construction. Because the right-of-way was dedicated, no urban development has occurred within the designated right-of-way. As a result, the alignment as shown is the only logical place to put a new highway within the corridor. Any other alignment would be disruptive to existing residential, commercial, and agricultural uses. The alignment was cleared environmentally through the 1991 EA. As a result, the issue is whether to upgrade SR 303L, not where should the road be placed.

Facility Type

SR 303L was envisioned as a freeway in the original *West Area Transportation Analyses* and all the subsequent location studies, EA, and right-of-way dedication. The route crosses 13 east-west arterial streets between I-10 and US 60. At each of these streets, there are three options for SR 303L: (1) signalized intersection (2) grade separation or (3) interchange. If all or most of the intersections are signalized, SR 303L will function much like an arterial street such as Cotton Lane or Sarival Avenue when the area becomes urbanized. As such, SR 303L would offer little advantage over these arterials. It is estimated that the maximum average overall speed on SR 303L through the project limits would be 42 mph if all intersections were signalized.

Such a roadway would not attract through traffic and would provide a continuation of the rural routes of US 60 and US 93 to link them to the interstate system and the urban freeway system. Such a route would not provide a high-speed, high-capacity part of the metropolitan freeway system that allows motorists to move long distances in the metropolitan area on a system that is designed for and can accommodate high volumes of traffic. As a result, a grade-separated, access controlled roadway is the only type of roadway that would meet the purpose and need of the project.

Some people have suggested that SR 303L be built as a "Parkway." The term "Parkway" does not have a firm and consistent definition. There are local and arterial streets in the metropolitan area that carry the designation of "Parkway." SR 51 was known as the "Squaw Peak Parkway," and it is a fully grade-separated, access-controlled highway more commonly called a "Freeway."

The 2001 *A Policy on Geometric Design of Highways and Streets* published by AASHTO does not use the term "Parkway" because of its highly variable meaning. An earlier definition was used that describes the older parkways that exist in some Eastern states. The definition used was "a fully or partially controlled access highway whose use is limited to passenger cars and is located in a park-like setting."

SR 303L is proposed to be built using state and federal highway user funds derived from passenger cars and trucks. These funds cannot be used to construct a roadway that would prohibit use by legal motor vehicles such as trucks. Therefore, SR 303L is not proposed to be restricted to passenger car usage only.

The SR 303L corridor has no existing characteristics that would characterize it as a "park-like setting." The adjacent land uses are agricultural which are giving away to urban development. The land is flat and essentially devoid of natural vegetation except in a few washes. To create a "park-like setting" would require great additional cost, additional right-of-way, and financial participation by local governments. These conditions do not appear to be achievable or desirable and, therefore, are not part of the proposed project.

Others have suggested that SR 303L be built as an "Expressway." Earlier versions of the MAG Long Range Transportation Plan described SR 303L as an expressway. The definition of an expressway is not consistent. For example, the Hohokam Expressway (SR 143) is called an expressway but it functions like a freeway. In Arizona, the general use of the word expressway refers to a fully or partial access-controlled highway that has widely spaced at-grade intersections and may have some grade separations. A potential interim roadway for SR 303L could function as an expressway.

With 13 arterial crossings of SR 303L between I-10 and US 60, at-grade intersections at each of these locations would result in the roadway functioning much like an arterial street. Traffic forecasts indicate that the proposed interim roadway will reach its practical capacity well before 2010. Traffic increases beyond that time would be limited because SR 303L would offer no advantage over the parallel arterials. As a result, SR 303L would not be serving its regional function of attracting external traffic from US 60 and connecting it to I-10 and serving longer regional trips within the metropolitan area. Eventually, all the parallel streets will be at capacity and the mobility in the area will be severely restricted.

The proposed facility type is a fully access-controlled grade-separated urban freeway. The ultimate planned number of lanes include four general purpose lanes in each direction plus and HOV lane in each direction and auxiliary lanes between one-mile spaced service interchanges. The initial freeway may consists of three lanes in each direction plus the auxiliary lanes. Depending upon the availability of funding, an upgraded interim road may be built as described in Section 10.9.

10.3 I-10 SYSTEM INTERCHANGE

The initial interchange configuration and location was identified in the *Final Design Concept Report, State Route Loop 303 (SR 303L), MC 85 to Indian School Road* prepared by HDR for MCDOT in December 2002 (Figure 10-1). This configuration was refined and several alternatives were explored based on comments from MCDOT, ADOT, FHWA, City of Goodyear, RID, and area landowners and developers.

Alternative 0 (Figure 10-2) was developed as a refinement to the original Base configuration by incorporating comments from ADOT. Major refinements included eliminating the dogleg in Cotton Lane at McDowell Road, eliminating the service ramps to/from Thomas Road that were connected to the system interchange ramps, accommodating a future HOV connection in the medians of I-10 and SR 303L, and changing the stacking order of the flyover ramps to accommodate the future HOV connection.

After these initial refinements, different stacking orders were explored to create additional alternatives. Alternative 1 (Figure 10-3) would depress the top-most ramps (EN & WS) under I-10 and SR 303L. This configuration would also require Ramp WS to be depressed under the RID Canal as well as the freeways which would, therefore, require the canal to be on a structure over the ramp.

Alternative 2 (Figure 10-4) would depress SR 303L and Cotton Lane under I-10 and place Ramps EN & WS at grade. This alternative was quickly eliminated due to profile conflicts.

Alternative 3 (Figure 10-5) would depress the frontage roads along I-10 and McDowell Road. This alternative was also eliminated early due to profile issues.

As alternatives were further identified, the City of Goodyear and landowners adjacent to the interchange expressed concern regarding access to and from I-10 and the southern quadrants of the system interchange.

Alternative 4 (Figure 10-6) attempted to equalize access among the four quadrants by replacing Cotton Lane between Thomas Road and Van Buren Street with a pair of one-way frontage roads on both sides of SR 303L. SR 303L would be depressed under McDowell Road and the I-10 frontage roads. All the frontage roads and McDowell Road would be at grade. The ramps to/from I-10 on the east side of Cotton Lane were eliminated. As Alternative 4 was being developed, the City of Goodyear commented that the eastbound frontage road impacted the residential properties in the southeast quadrant of the interchange, near Sarival Avenue, and would require the acquisition of several parcels, including a linear park that was placed between the residences and I-10. Goodyear requested that the configuration be revised to avoid taking the park and residential properties. Therefore, the I-10 alignment was shifted approximately 250 feet to the north to avoid taking additional right-of-way in that area.

Alternative 5 (Figure 10-7) would maintain the same stacking order as Alternative 4, but would eliminate the frontage roads along SR 303L and restore Cotton Lane as a two-way road between Thomas Road and Van Buren Street.

Alternative 6 (Figure 10-8) was similar to Alternative 5, but would eliminate the I-10 frontage roads between Cotton Lane and Sarival Avenue and place ramps to and from I-10 on the east side of Cotton Lane.

These alternatives were presented to agency and property owner stakeholders in several meetings. The property owner in the southwest quadrant expressed a desire to have more direct access from I-10. To meet that request, modified Alternatives 1, 4 and 5 were developed by adding a westbound off-ramp at Cotton Lane. These modified alternatives were identified as 1A, 4A and 5A. In addition, Alternative 4A was modified to replace the eastbound frontage road between Cotton Lane and Sarival Avenue with an entrance ramp to eastbound I-10.

These alternatives were evaluated and discussed with agency stakeholders. FHWA and ADOT commented that the additional ramps on I-10 for Alternatives 1A, 4A and 5A would provide four exits in about one mile. This configuration would require short weaving distances approaching these ramps. FHWA expressed concern that this condition would adversely affect operations and safety. ADOT and MCDOT agreed and Alternatives 1A, 4A, 5A were eliminated.

The remaining alternatives (1, 4, 5 and 6) were evaluated based on access to and from adjacent properties. A matrix summarizing the ease of access (Figure 10-9) was generated and included factors such as length of route and number of signals in evaluating the ease of access for each alternative configuration. The alternatives were ranked in each quadrant for access to and from I-10 and SR 303L. This evaluation indicates that while Alternatives 5 and 6 provided the best overall access to all quadrants of the interchange taken as a whole, they provided better access to the west side of the interchange at the expense of the east side access. Alternative 4 provides more evenly balanced access to all quadrants of the interchange. This was deemed to be more desirable by the stakeholders.

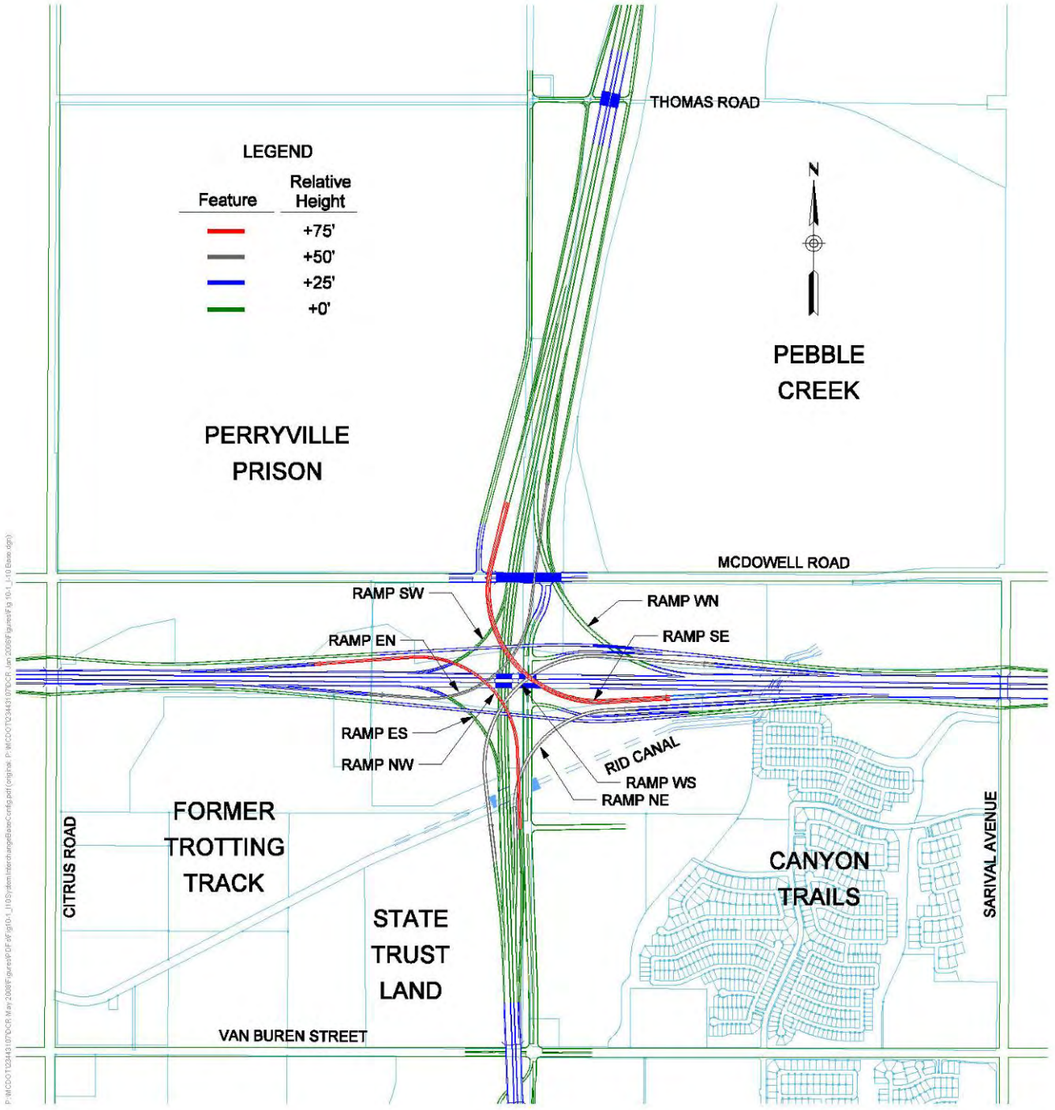


Figure 10-1 I-10/SR 303L System Interchange Base Configuration

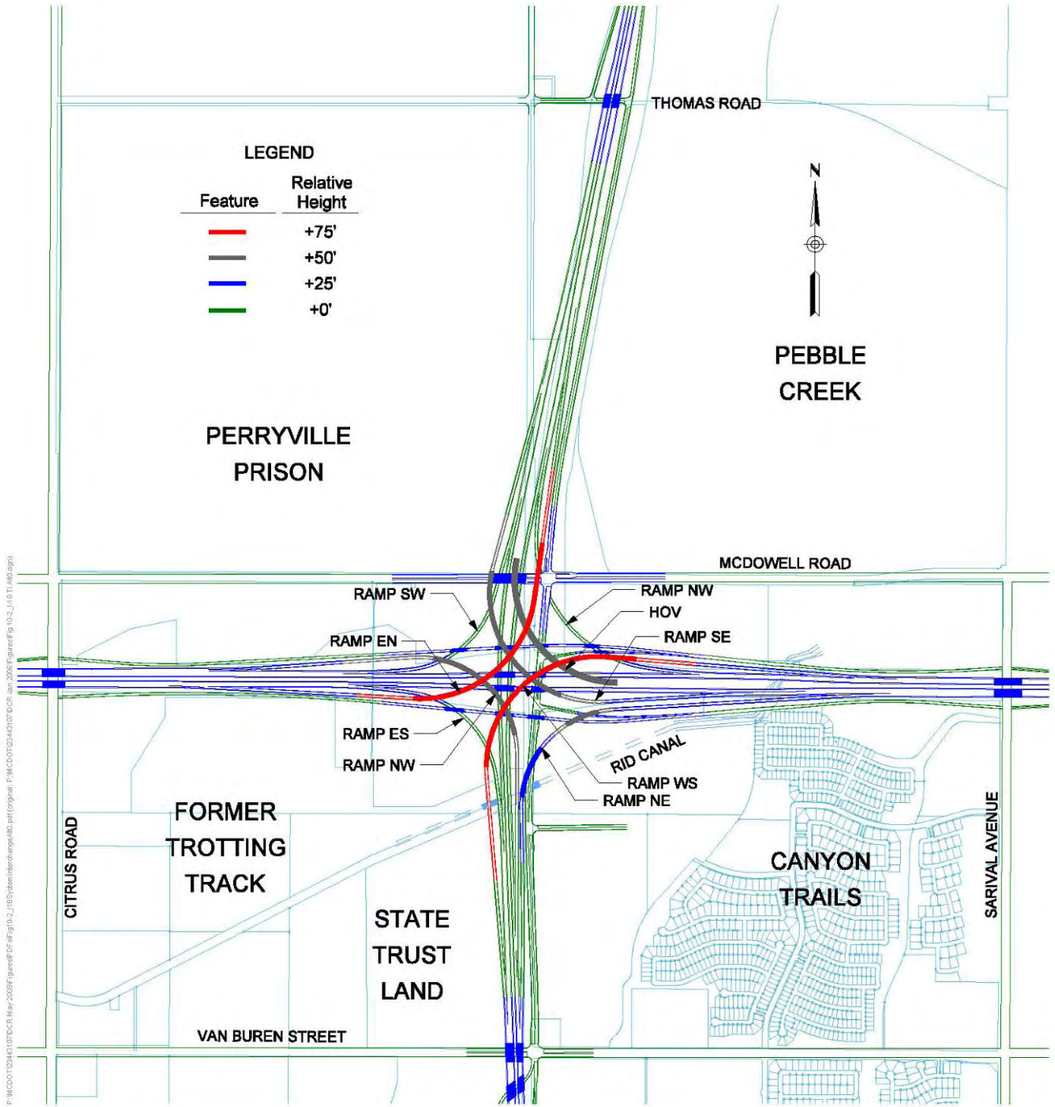


Figure 10-2 I-10/SR 303L System Interchange Alternative 0

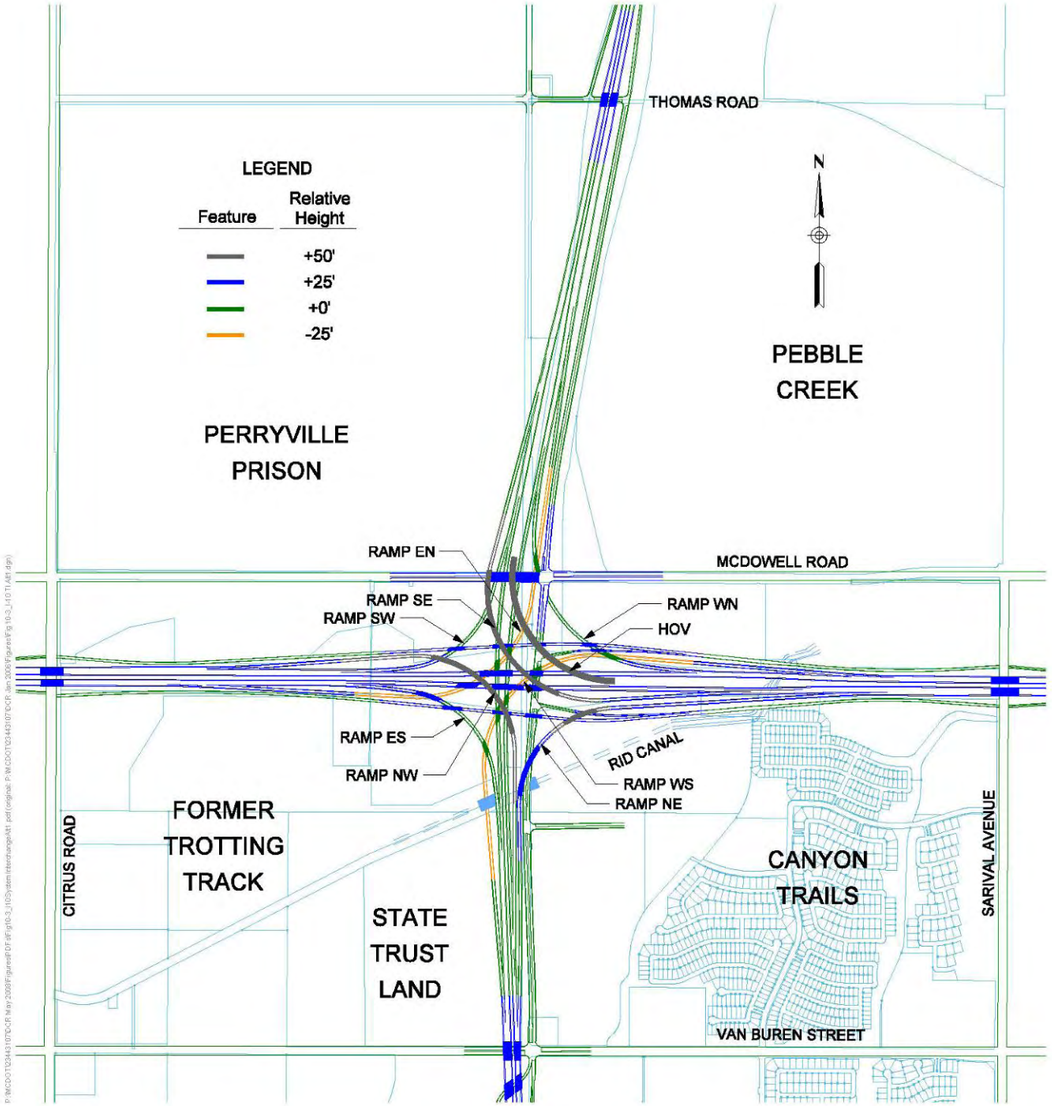


Figure 10-3 I-10/SR 303L System Interchange Alternative 1

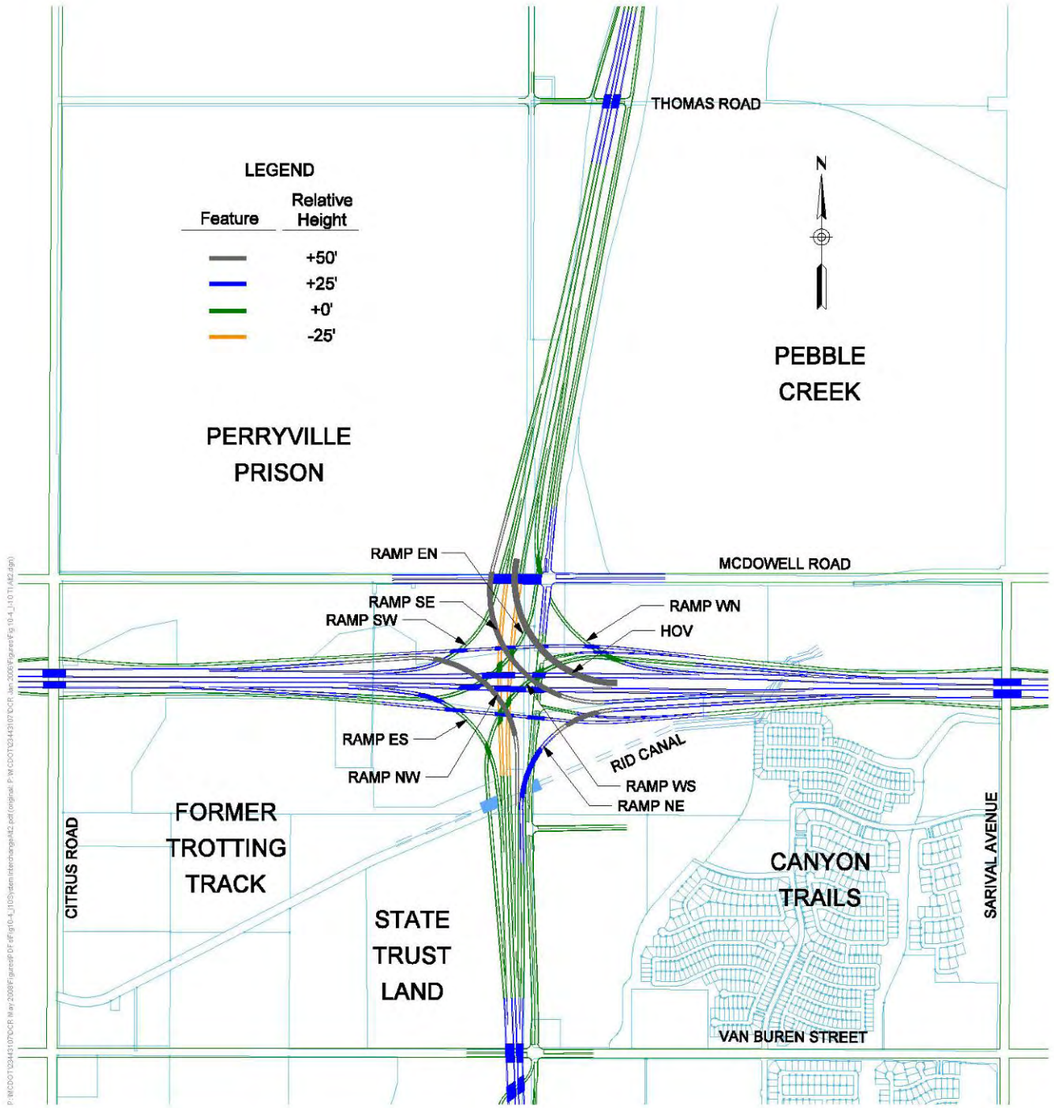


Figure 10-4 I-10/SR 303L System Interchange Alternative 2

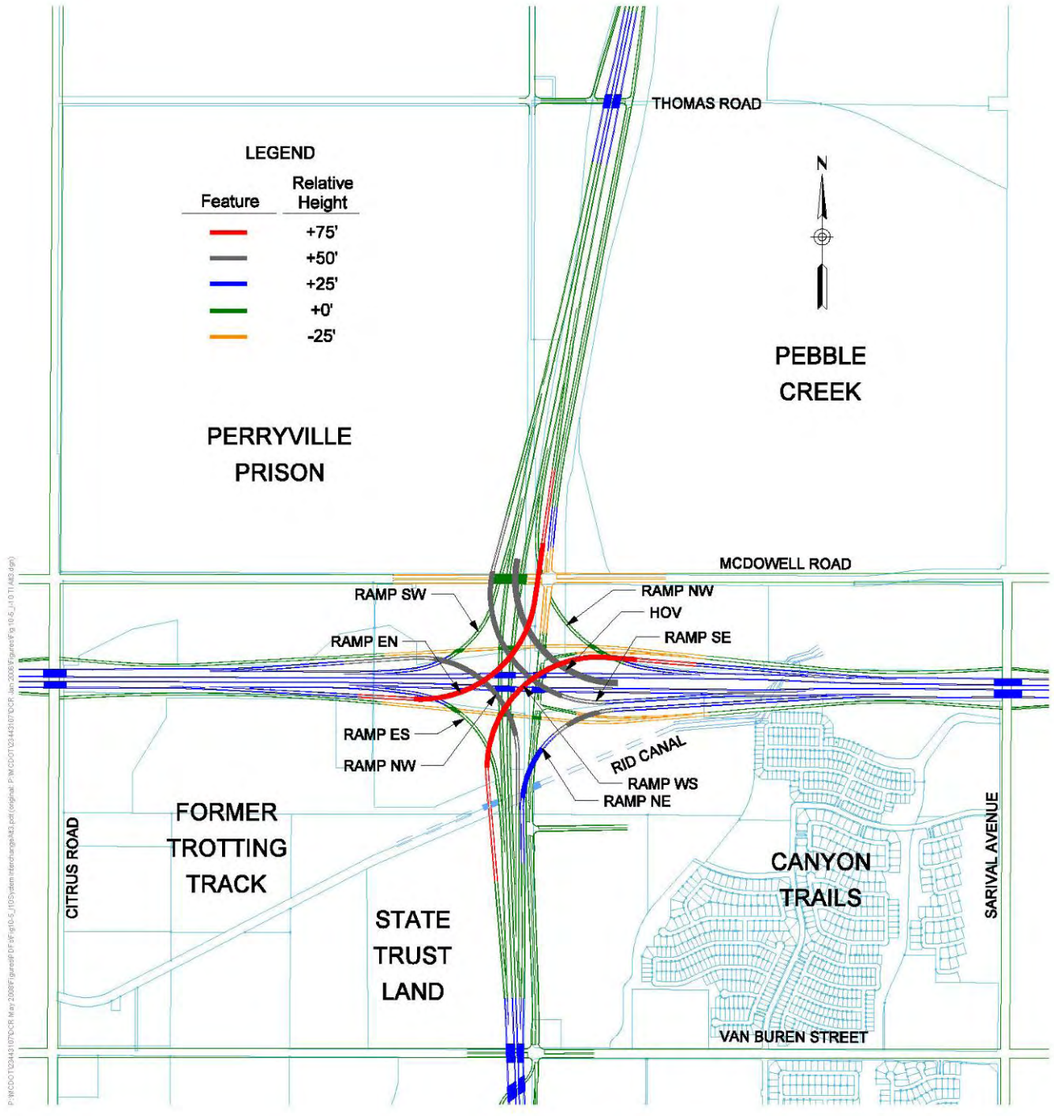


Figure 10-5 I-10/SR 303L System Interchange Alternative 3

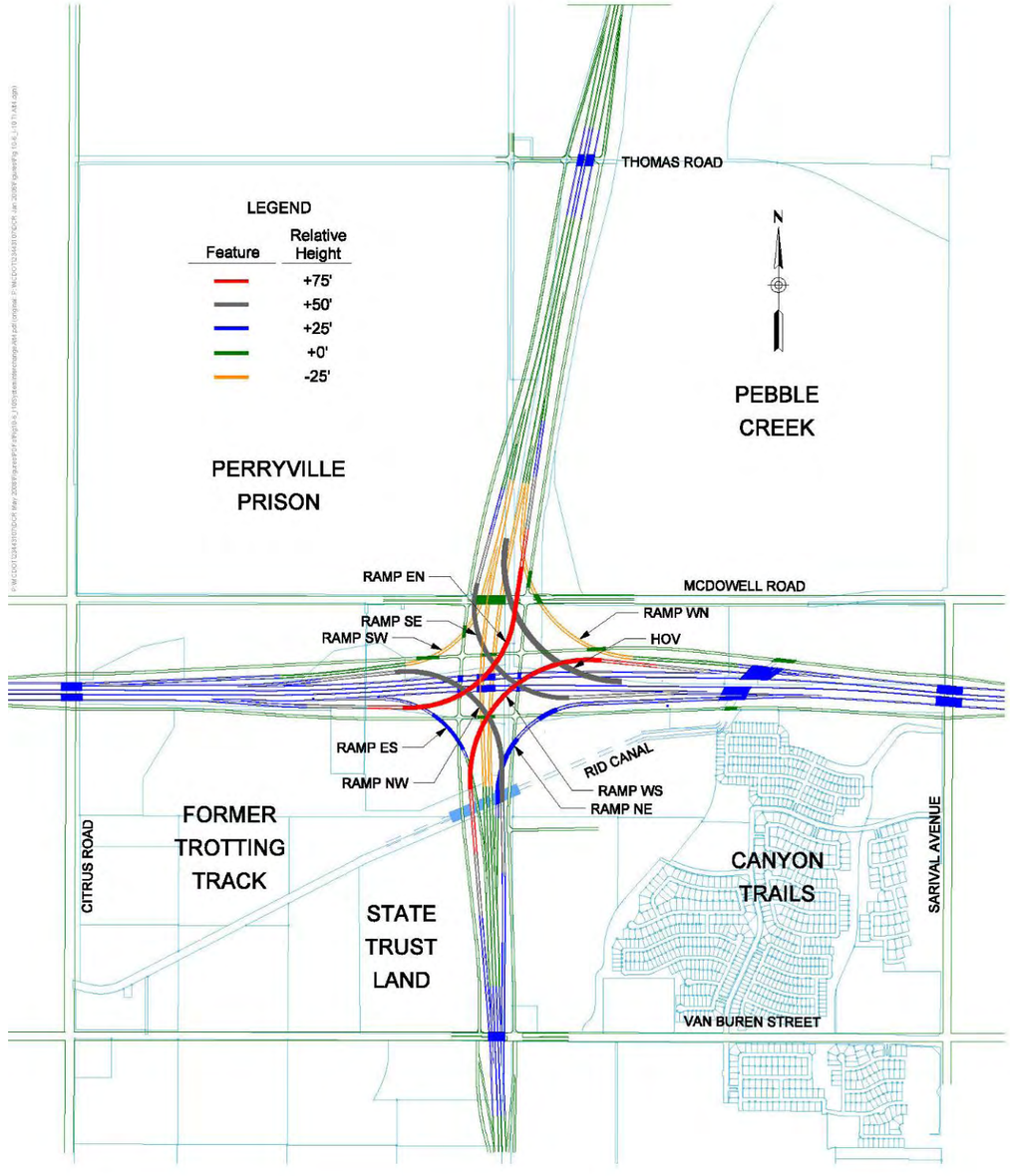


Figure 10-6 I-10/SR 303L System Interchange Alternative 4

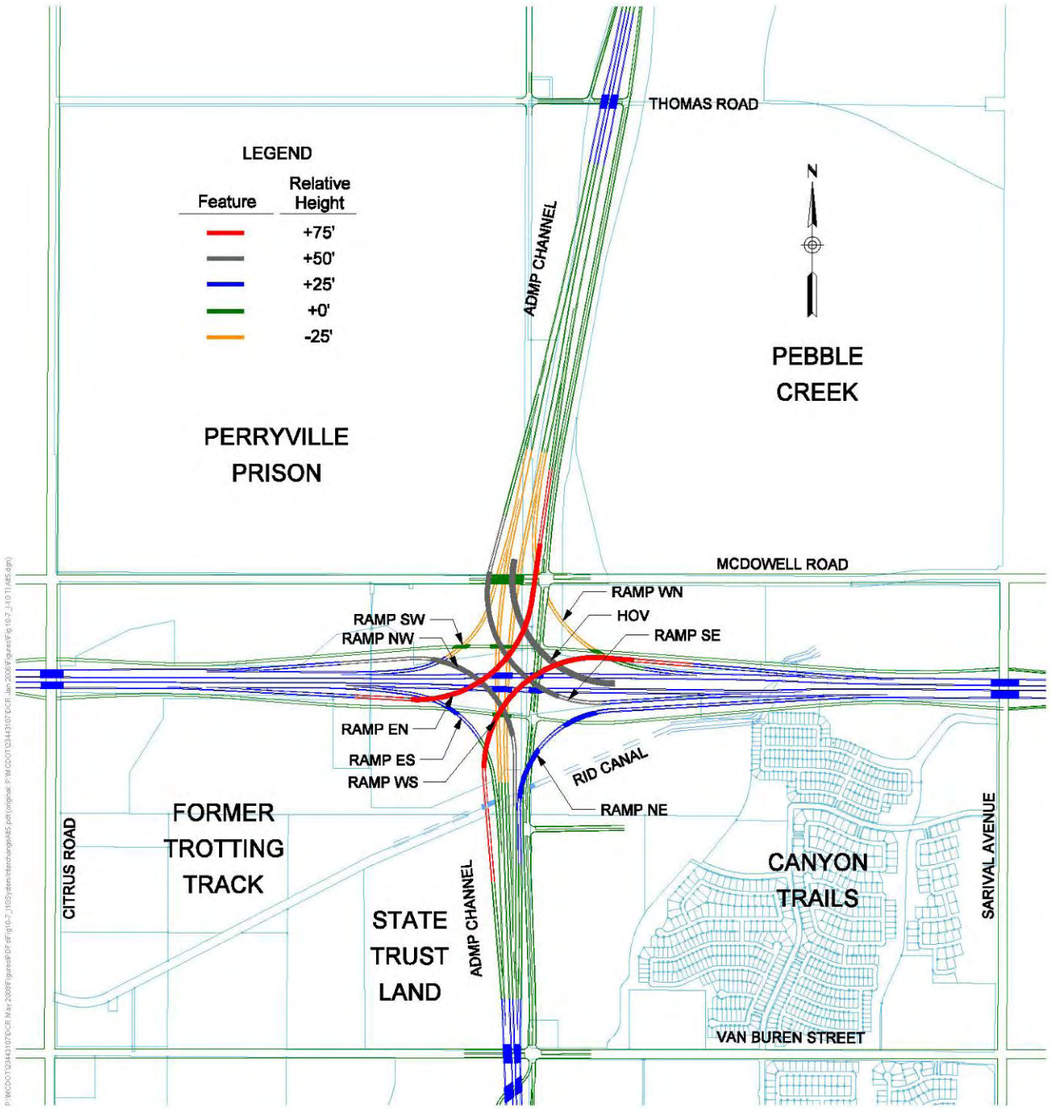


Figure 10-7 I-10/SR 303L System Interchange Alternative 5

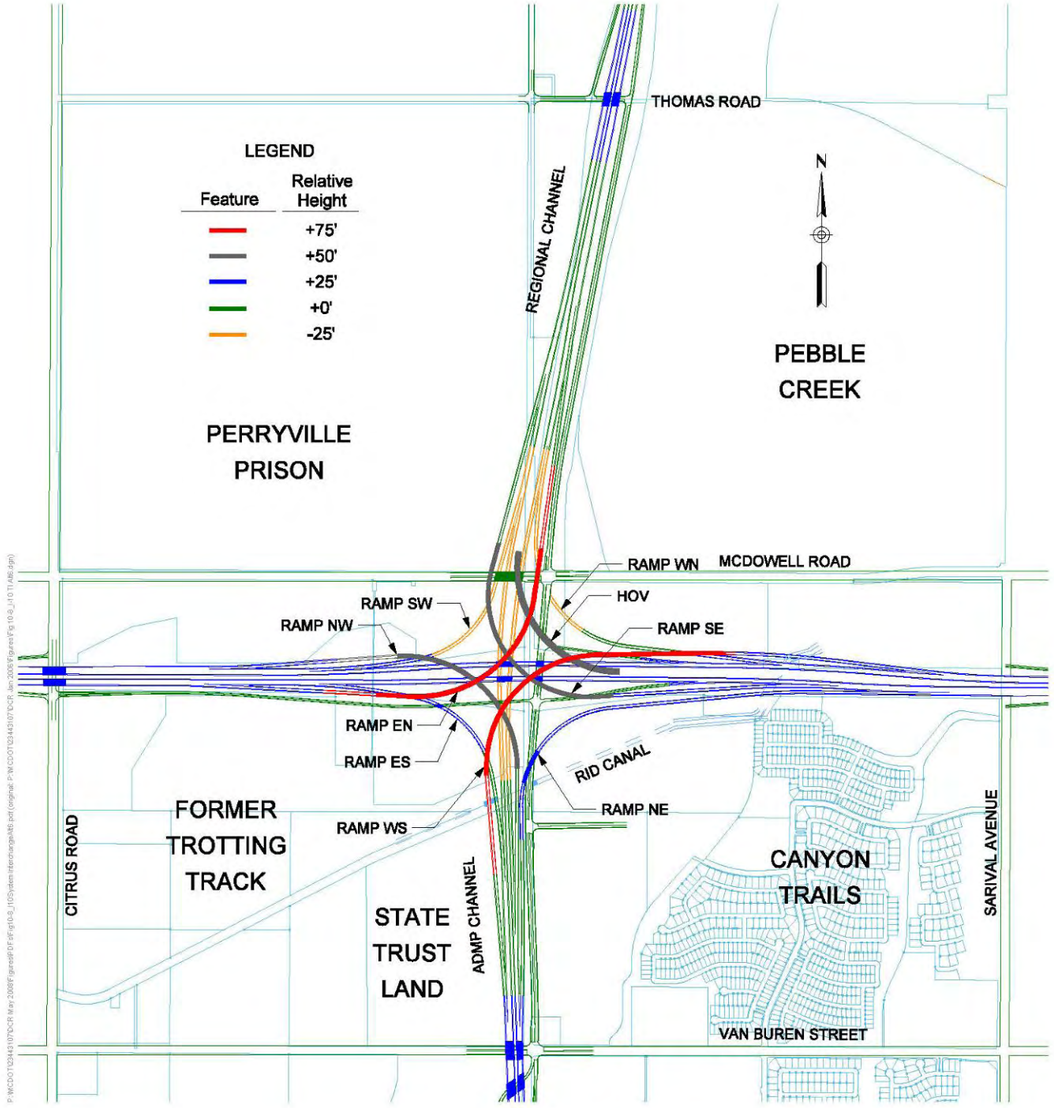
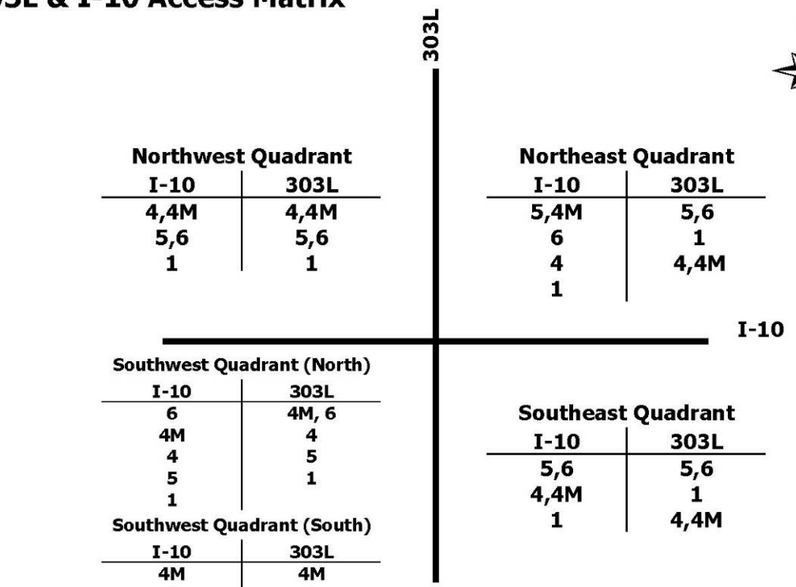


Figure 10-8 I-10/SR 303L System Interchange Alternative 6

303L & I-10 Access Matrix



Northwest Quadrant

I-10	303L
4,4M	4,4M
5,6	5,6
1	1

Northeast Quadrant

I-10	303L
5,4M	5,6
6	1
4	4,4M
1	

Southwest Quadrant (North)

I-10	303L
6	4M, 6
4M	4
4	5
5	1
1	

Southwest Quadrant (South)

I-10	303L
4M	4M
4	4
6	6
5,1	5,1

Southeast Quadrant

I-10	303L
5,6	5,6
4,4M	1
1	4,4M

Access Area & Movement	Alternative Ranking									
	Alt. 1		Alt. 4		Alt. 4M		Alt. 5		Alt. 6	
NW Quadrant to and from East Leg (I-10)	2		2		2		2		1	
NW Quadrant to and from West Leg (I-10)	4		1		1		2		3	
NW Quadrant to and from North Leg (303L)	3		1		1		2		2	
NW Quadrant to and from South Leg (303L)	3		1		1		2		2	
NE Quadrant to and from East Leg (I-10)	3		4		2		2		1	
NE Quadrant to and from West Leg (I-10)	4		1		1		1		3	
NE Quadrant to and from North Leg (303L)	2		3		3		1		1	
NE Quadrant to and from South Leg (303L)	2		3		3		1		1	
	N	S	N	S	N	S	N	S	N	S
SW Quadrant to and from East Leg (I-10)	4	4	3	2	1	1	4	4	1	3
SW Quadrant to and from West Leg (I-10)	4	3	2	1	2	1	3	3	1	2
SW Quadrant to and from North Leg (303L)	5	4	2	2	1	1	3	4	2	3
SW Quadrant to and from South Leg (303L)	4	2	2	1	2	1	3	2	1	2
SE Quadrant to and from East Leg (I-10)	3		4		4		2		1	
SE Quadrant to and from West Leg (I-10)	4		3		3		1		2	
SE Quadrant to and from North Leg (303L)	2		4		4		1		1	
SE Quadrant to and from South Leg (303L)	1		3		3		1		1	

Figure 10-9 SR 303L & I-10 Access Matrix

An important issue to FHWA and ADOT was continuity through the interchange and consistent access points to and from the freeway. It is important to FHWA to eliminate half diamonds wherever possible unless they are connected by frontage roads to another half diamond. Alternative 6 would have provided a half diamond at Sarival Avenue only, while Alternatives 4 and 5 provided a split diamond connected by frontage roads between Citrus Road and Sarival Avenue. Alternative 6 was therefore eliminated.

Of the remaining alternatives, Alternative 1 provided the worst access. It also required the RID Canal to be put in a structure to cross over a major system ramp, which was a disadvantage compared to the other alternatives. Alternative 1, therefore, was eliminated.

Between Alternatives 4 and 5, FHWA and ADOT preferred Alternative 4 due to the consistency of the frontage roads along I-10 and SR 303L. FHWA and ADOT felt that the frontage roads better met driver expectations and would be less confusing. The frontage roads also provide a convenient detour route during traffic events, construction or maintenance on the freeway mainlines. The property owners in the southwest quadrant also preferred Alternative 4 due to the better access. A consensus was reached, and Alternative 4 was chosen as the recommended alternative.

ADOT requested that roundabouts be considered for the frontage road intersections at the core of the system interchange for the recommended alternative. Two options were explored. The first option placed roundabouts at each individual intersection, resulting in four separate roundabouts. The second option replaced the four intersections with one large roundabout. Traffic analysis showed the first option would not operate very efficiently due to the one-way nature of the frontage roads. It would be difficult for vehicles to enter the roundabouts and long queues would result. The second option would physically resemble a square with rounded-off corners due to physical constraints. The relatively long tangent portions would encourage higher speeds and, combined with the tight corners, would lead to an increase of loss-of-control accidents. In addition, the higher speeds would intimidate drivers from entering the roundabout, which would result in long queues. The conclusion was that roundabouts offer no advantage over the two-phase signals needed at intersection of two one-way roads.

Alternative 4 was developed in more detail and is described in Section 12.7, and the plans are shown in Chapter 15.

10.4 US 60 INTERCHANGE

US 60 (Grand Avenue) is a four-lane divided major arterial that serves a the connection of US 93 from Las Vegas, Nevada and I-15 to the Phoenix Metropolitan Area and I-10 and I-17. Grand Avenue also serves as an urban arterial in the cities of Surprise, El Mirage, Peoria, Glendale and Phoenix. The *Grand Avenue Northwest Corridor Study, SR 303L to SR 101L* prepared by URS for MAG in January 2003 concluded that

Grand Avenue should be widened to six lanes and that selected grade separations may be considered in the future.

The City of Surprise is expected to grow and develop extensively to the northwest on both sides of US 60. The Town of Buckeye has already annexed extensive property west of Surprise and major urban developments are planned. This urban growth is expected to place heavy traffic burdens on US 60 and on the US 60/SR 303L interchange.

Several alternatives were identified and evaluated as presented in a Technical Memorandum provided in Appendix A. The presence of the BNSF on the north side of US 60 is a major constraint in the design of a workable and cost effective interchange configuration at this location. In 1999, a study was prepared for MCDOT by Cannon and Associates that recommended a partial cloverleaf interchange with all ramps located on the south side of US 60. This type interchange has historically been used in situations where a railroad parallels a street crossing a freeway.

Based upon the 2030 traffic forecasts provided by MAG, the partial cloverleaf interchange would not provide adequate capacity to meet the traffic demand. Another consideration is that the southbound SR 303L to eastbound US 60 ramp is a tight loop on a downgrade. This configuration has historically resulted in a higher incidence of trucks turning over and vehicles running off the road. As a result, ADOT is eliminating all such configurations at other locations on the freeway system. Other alternatives for the US 60/SR 303L interchange were identified.

The first iteration of alternatives included the following:

- Partial Cloverleaf
- Platform Diamond
- Stacked Diamond (3 level SPUI)
- Semi Directional

The partial cloverleaf has the limitations as described above. The platform diamond was eliminated because it would have less capacity than the stacked diamond (3-level SPUI) and it would encroach on BNSF right-of-way and have limited sight distance on ramps and ramp connectors.

The semi-directional alternative was eliminated because of potential noise and visual impacts to adjacent neighborhoods, high construction costs, and greater right-of-way requirements.

In a second iteration, two additional alternatives were developed that included the Stacked Diamond configuration for the off-ramps from SR 303L combined with loop and direct ramp on-ramps to SR 303L. Both of these alternatives would operate at an acceptable level of service in 2030 and each alternative would require either one or two traffic signals on Grand Avenue.

The stacked diamond (3 level SPUI) is the recommended configuration because it would provide the best traffic service for the ramp traffic and would eliminate all traffic signals on Grand Avenue for this interchange. The configuration would have all the ramps slightly or fully depressed so that noise and visual impacts are expected to be the least of all the alternatives. This configuration is the most symmetrical and would be the easiest for drivers to understand and anticipate the movements. This configuration is expected to be more expensive than the other alternatives.

The stacked diamond (3 level SPUI) was developed in more detail and is described in Section 12.8 and the plans are shown in Chapter 15.

10.5 NORTHERN PARKWAY SYSTEM INTERCHANGE

Northern Parkway is a super street concept being developed by the City of Glendale and is projected to carry about 80,000 vpd. The street is expected to be a major thoroughfare serving the West Valley. It is planned to intersect SR 303L at the half-mile section line between Northern Avenue and Olive Avenue.

An analysis was conducted regarding where to place the interchange on SR 303L. Alternative locations ranged from at Northern Avenue to Olive Avenue and several alternatives that would involve both cross streets. Earlier in the preparation of the April 24, 2002 IDCR, consideration was given to eliminating some of the section line road interchanges. Very preliminary alignments were laid out that would have Northern Avenue realign to Olive east of SR 303L so that the interchange at Northern Avenue could be eliminated. Other realignments were also considered. The conclusion was reached that the road realignments would require extensive new right-of-way and would slice diagonally through existing agricultural property. The right of way cost was expected to be substantial because the realigned roads would impair development of the farmland. Accordingly, the decision was made to keep all arterials on or near the section lines and to plan for interchanges at each location.

With the proposed Northern Parkway (super street) by the City of Glendale, the issue of interchange location was reopened. During the Northern Parkway DCR preparation, Luke AFB requested the parkway alignment be moved to the north away from the northern end of the runway which ends just southwest of the Northern Avenue/Litchfield Road intersection. The selected alignment for the parkway will curve north of the Northern Avenue section line just west of Dysart Road. It is planned to curve again to cross Litchfield Road approximately one-half mile north of the section line (Butler mid section line). The parkway

alignment would then continue westward on the north side of this mid section line to Reems Road. At that point, the parkway could either continue straight to SR 303 or swing south to the Northern section line. The analysis of the location of the SR 303L/Northern Parkway interchange was conducted as part of this SR 303L DCR and is described below.

Several alternatives were identified and evaluated as presented in a Technical Memorandum provided in Appendix A. The main consideration was the projected 2030 traffic forecasts by MAG. The recommended alternative would have to accommodate the heavy traffic expected to and from Northern Parkway. Five options were developed for the interchange configuration and evaluated based on cost, access, right-of-way, and number of free-flow connections. After much discussion and coordination with ADOT, MCDOT and the City of Glendale, the recommended alternative was determined to be a fully directional interchange with frontage roads, forming a split diamond between Northern Avenue and Olive Avenue (now Peoria Avenue, see Section 10.6).

The interchange was developed in more detail and is described in Section 12.9, and the plans are shown in Chapter 15.

10.6 OLIVE AVENUE INTERCHANGE AND BNSF CROSSING

SR 303L is planned to be elevated at the Olive Avenue interchange due to the BNSF railroad spur that runs parallel to Olive Avenue on the north side. The ultimate Olive Avenue alignment is planned to be shifted to the south to avoid impacting railroad right-of-way and to provide room for bridge piers between the railroad and the street. Minimum clearances of 16.5 feet for Olive Avenue and 24.5 feet for the railroad were provided. Depending on the sequence of construction and bridge type selection, additional clearance may be required for falsework if the bridge is built over traffic.

Originally, ramps to and from the north were planned at Olive Avenue. These ramps would cross the BNSF Railroad at grade. This spur track currently serves a single customer (Fertizona) and has two or three deliveries per week of one or two train cars. ADOT has determined that access controlled ramps cannot cross railroads at grade; therefore, one-way frontage roads are proposed connecting Olive Avenue to Peoria Avenue.

10.7 INDIAN SCHOOL ROAD INTERCHANGE

The Indian School Road interchange was described in the previous report *Initial Design Concept Report, SR 303L, Indian School Road to Clearview Boulevard* (dated April 24, 2002) by URS for MCDOT as having SR 303L at grade with Indian School Road elevated over the freeway. At the request of the City of Goodyear and MCDOT, URS revised the configuration to keep Indian School Road at grade and either depress or elevate SR 303L at the cross street.

URS analyzed the ramifications of depressing the freeway versus elevating it over Indian School Road. The analysis showed that while depressing the freeway would reduce borrow cost, the cost of draining the depressed area would be very expensive and would negate any savings in earthwork costs. Accordingly it was decided to elevate the freeway over Indian School Road.

Also in the April 2002 IDCR, Indian School Road was shifted to the north to avoid taking additional right-of-way south of the street. At the time, it was thought that development was imminent on the south side of Indian School Road, and the street was, therefore, shifted to the north to avoid any conflicts. In subsequent discussions with the City of Goodyear, it was determined that the property on both the north and south sides of Indian School Road had the same owner and it was the City of Goodyear's preference to keep the street on the current alignment along the section line.

10.8 OTHER SERVICE INTERCHANGES

During the preparation of the IDCR in April 2002, consideration was given to elimination of interchanges at certain locations. More widely spaced interchanges improve traffic operations on the freeway and reduce cost. After review and analysis it was decided to retain plans for interchanges at all locations from Indian School Road to Bell Road for the following reasons: (1) right-of-way had been dedicated by property owners in most cases so there is an expectation of interchange access; (2) skipping interchanges at other locations in the Valley has proven to create overloads at the adjacent interchanges; and (3) if grade separations have to be built, then the cost savings of not building an interchange is fairly small.

Bell Road is expected to be the highest volume service interchange along this section of SR 303L. The design concept shown in this report indicates a tight-diamond type interchange. A SPUI will fit within the tight diamond footprint although it will cost more. In the next phase of corridor development, a SPUI should be considered at this location.

Recently, ADOT has become highly interested in considering the use of roundabouts at the ramp terminals of service interchanges. Happy Valley Road at I-17 is the first such interchange constructed in the state. Roundabouts are currently being designed for Carefree Highway and I-17 and for Brown and McKellips roads at SR 202L in Mesa. Roundabouts are being considered by ADOT in the preparation of the SR 303L Design Concept Report from Happy Valley Road to I-17. Depending upon the conclusions reached in that study process, roundabouts may be considered for the I-10 to US 60 section.

Roundabouts do require additional right-of-way compared to the tight diamond interchange used in this DCR. Sufficient right-of-way width for roundabouts is not included in the plans shown in Chapter 15.

10.9 INTERIM ROADWAY ALTERNATIVES

During the preparation of the IDCR printed April 24, 2002, funding sources for the full freeway were not identified so that it appeared likely that an interim roadway would have to be constructed and later converted to a full freeway. Several different four-lane interim roadway concepts were developed and evaluated based on cost (both interim and ultimate), constructability, ease of conversion to the ultimate freeway, amount of throwaway construction in converting to the ultimate condition, safety, capacity and ability to accommodate free-flow traffic. Each of these concepts were applied along the corridor in various combinations until a preferred alternative was chosen, the results of which are presented below. This concept is designated Interim A, and it would appear as a logical choice if full funding were not readily available but was expected to be available within 5 or 10 years. This interim concept would provide a four-lane divided roadway that could be converted to the full freeway without a lot of throwaway construction.

An alternative interim roadway concept was developed at the request of MCDOT to present a low-cost option to Interim A. This concept is designated Interim B and it would appear as a logical choice if full funding is not expected for many years to come. This interim concept would provide a four-lane undivided roadway that would could not be used in the upgrading to a full freeway.

Interim A

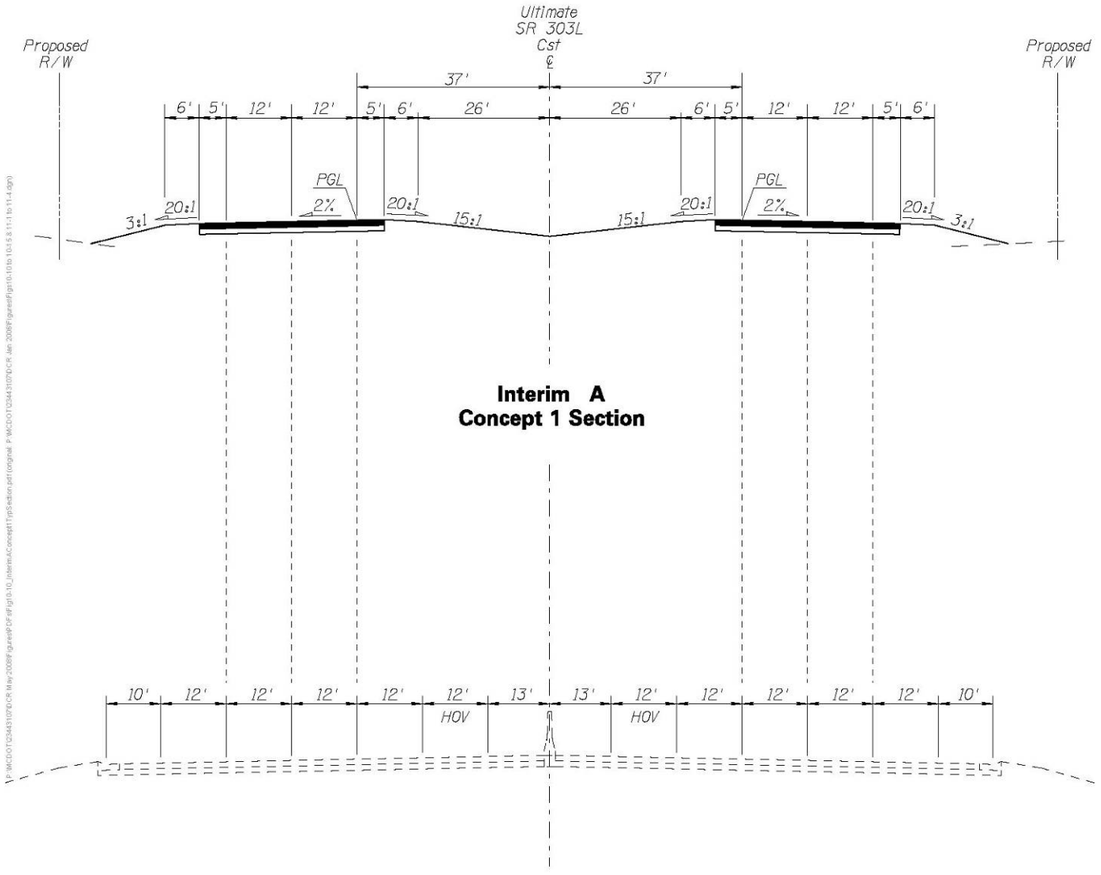
Interim A was developed with the philosophy of minimizing throwaway construction when the time comes to convert the interim roadway to the ultimate freeway. The concept also maximizing the use of the existing pavement to reduce the immediate cost of constructing the interim roadway. Interim A would be designed to ADOT highway standards in order to maximize the amount of construction that could be used for the ultimate freeway. Interim A concept includes use of PCCP for all “permanent” pavement to be used in the ultimate condition. “Temporary” throwaway pavement would be asphalt.

Three different concepts for Interim A would be used along the 15-mile section depending upon specific circumstances along the existing route :

- ***Concept 1: Build four lanes of ultimate section*** – No existing pavement would be used in this concept. Instead, the existing roadway would be demolished and the outer four lanes (two for each direction) of the ultimate freeway section would be built. This concept would be used in areas where the existing pavement lies in an inconvenient location, such as along the ultimate centerline. Converting to the ultimate freeway would be relatively simple. Traffic on the new interim roadway could be maintained while grade separations, ramps and additional through lanes are added in the future. See Figure 10-10.

- ***Concept 2: Build two lanes along the ultimate mainline alignment for one direction of traffic; use existing pavement for the other direction*** – In areas where there is sufficient separation between the existing pavement and half of the ultimate freeway (either northbound or southbound), this concept would be used to maximize the utilization of the existing pavement while the new construction would be used as part of the ultimate freeway. Again, with the appropriate construction staging, the ramps and cross street bridges could be built with minimal impact on existing traffic. See Figure 10-11.

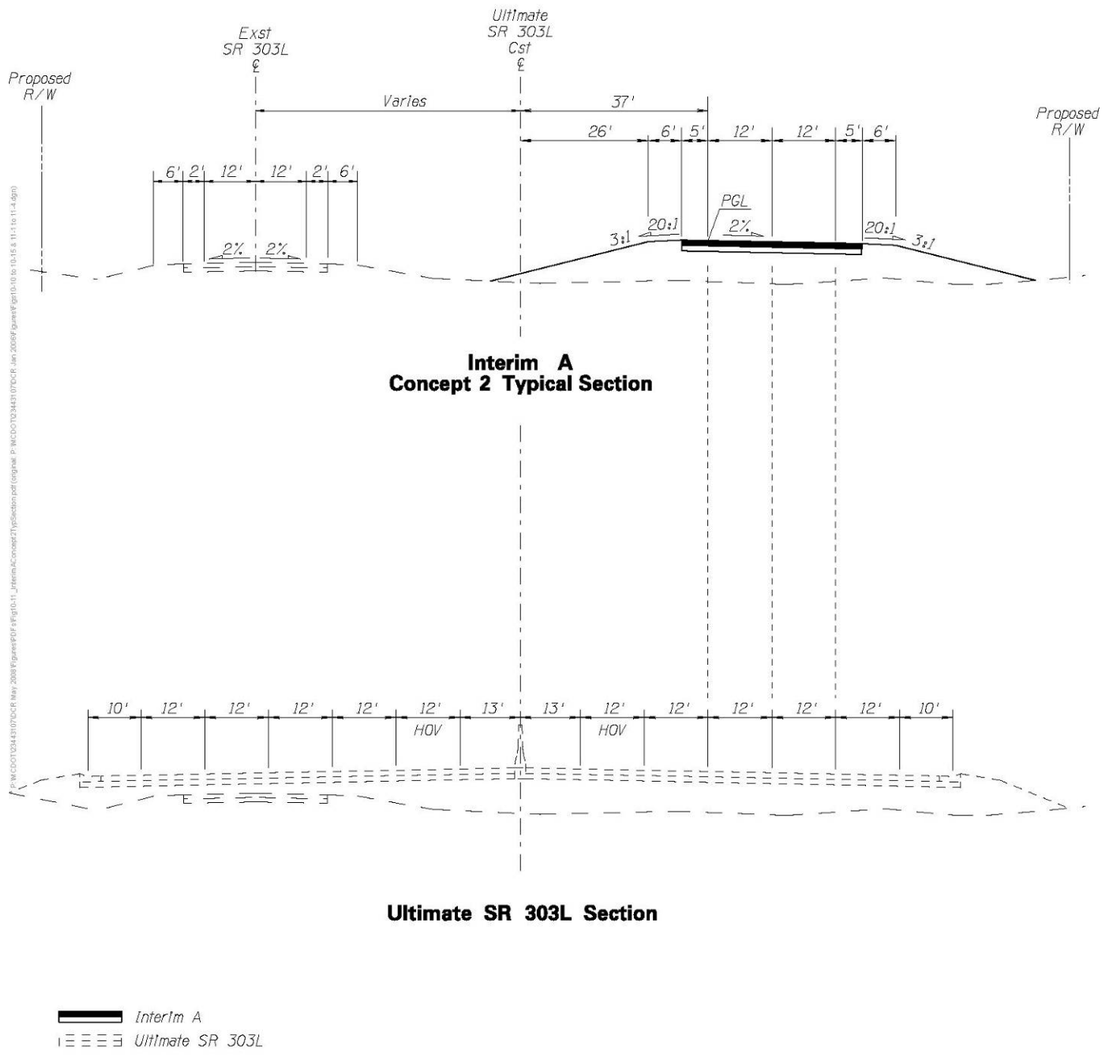
- ***Concept 3: Build two lanes along ultimate ramp alignments for one direction of traffic; use existing pavement for the other direction*** – In areas where SR 303L is either elevated or depressed and the cross street would remain at-grade, the new construction would follow the ramp and auxiliary lane alignments. This concept would allow most of the new construction to be salvaged for the ramps and auxiliary lanes while minimizing the interim throwaway pavement. The interim pavement section would be 34 feet wide (two 12-foot lanes and 5-foot shoulders) and would widen out to 58 feet at the intersections to accommodate left- and right-turn lanes. The ultimate ramps would be 28 feet wide for entrance ramps and 22 feet (along the body) to 40 feet wide (at the inter-sections) for exit ramps. The additional width required for the interim pavement in these areas would be asphalt and removed when the ultimate is constructed. See Figure 10-12 and Figure 10-13. An alternative concept is to construct temporary “throwaway” pavement for interim A generally along the ramp alignments. This concept would allow better alignment during use as the interim through roadway and allow greater flexibility in design of the ultimate ramp geometry.



Interim A
Concept 1 Section

Ultimate SR 303L Section

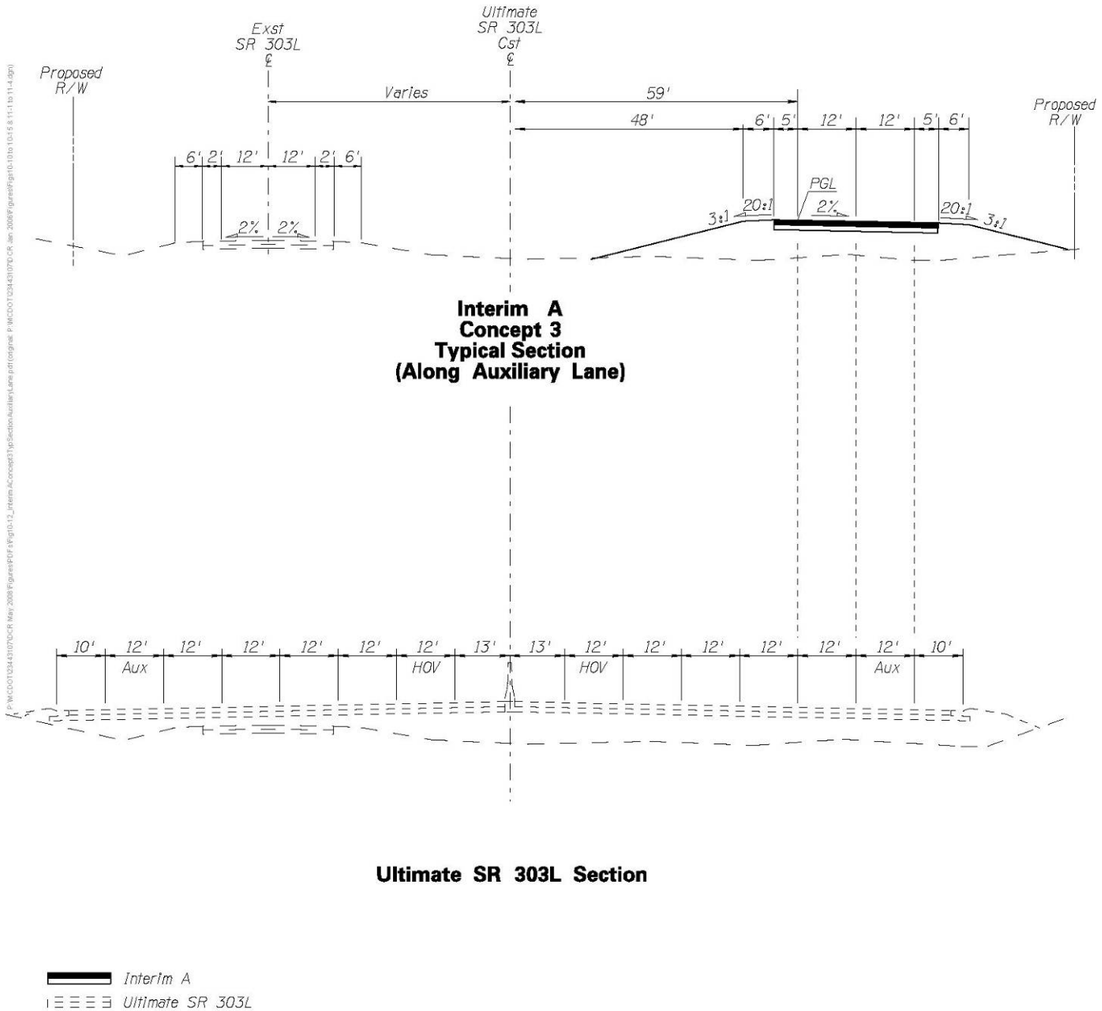
Figure 10-10 Interim A: Concept 1 Typical Section



Interim A
Concept 2 Typical Section

Ultimate SR 303L Section

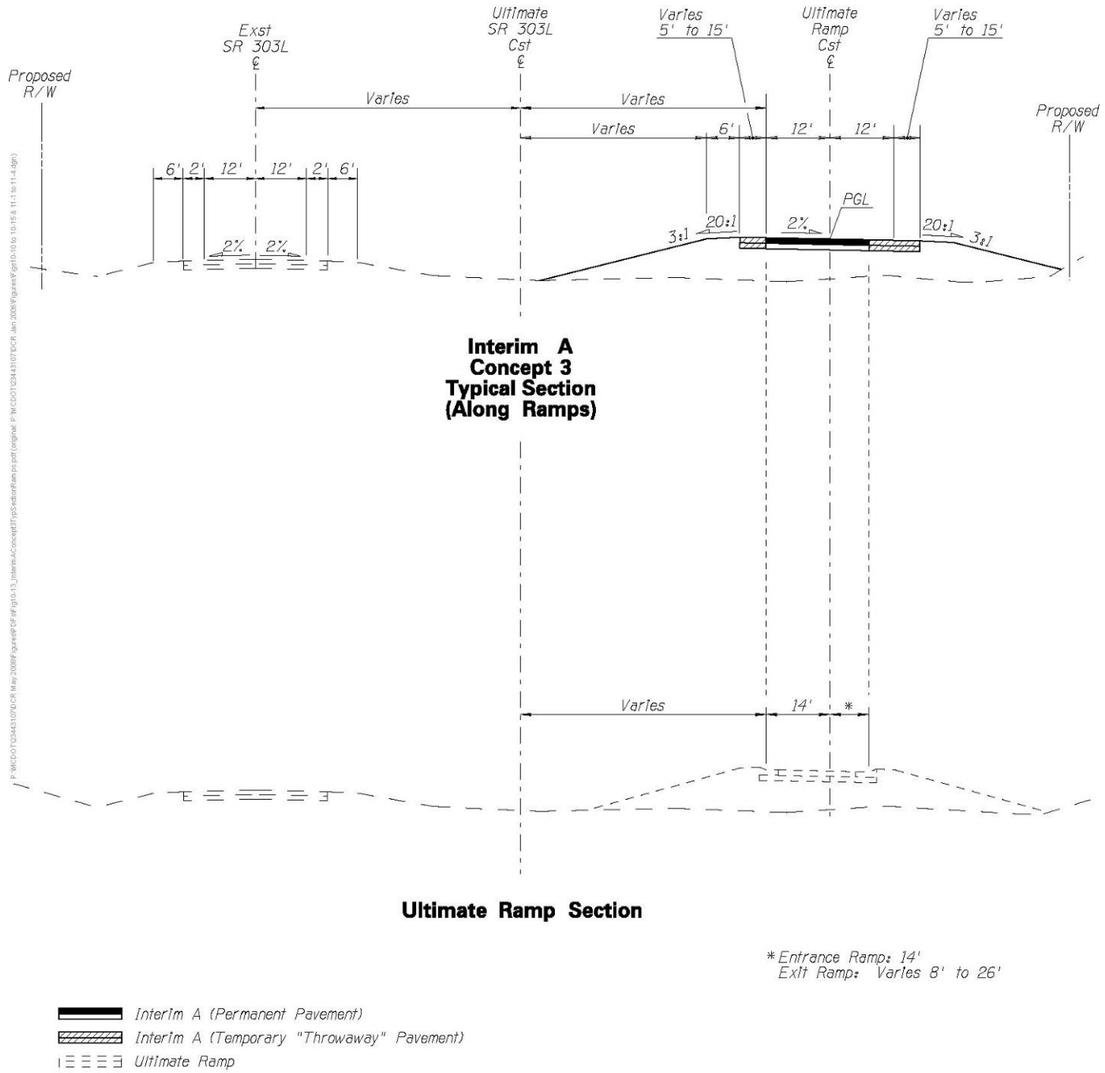
Figure 10-11 Interim A: Concept 2 Typical Section



Interim A
Concept 3
Typical Section
(Along Auxiliary Lane)

Ultimate SR 303L Section

Figure 10-12 Interim A: Concept 3 Typical Section (Along Auxiliary Lane)



Interim A
Concept 3
Typical Section
(Along Ramps)

Ultimate Ramp Section

Figure 10-13 Interim A: Concept 3 Typical Section (Along Ramps)

Cotton Lane at I-10 would have to be widened and the interchange signalized for Interim A. MCDOT has already upgraded SR 303L to a four-lane divided roadway between McDowell Road and Indian School Road, and this would be kept for Interim A. Concept 1 described above would be used from Indian School Road to approximately one-half mile north of Northern Avenue. In this section, the existing pavement is in conflict with the ultimate pavement location or with the location of the off-site drainage channel along the west side of the roadway.

At Olive Avenue, Concept 3 would be utilized because SR 303L would be elevated in the ultimate condition. From just south of Peoria Avenue to south of Greenway Road, Concept 2 would be used because of the wide separation of the ultimate SR 303L and the existing pavement.

From just south of Greenway Road to just north of Bell Road, temporary pavement would be constructed for the northbound lanes and the existing pavement would be used for the southbound lanes. Even though the ultimate freeway is depressed in this area, Concept 3 would not be appropriate due to the elevation of Greenway Road over the mainline. The extension of the temporary pavement begun at Greenway Road to Bell Road would be logical.

North of Bell Road, the existing interim roadway has been constructed along the ultimate southbound roadway, and Concept 2 would be used to construct ultimate lanes for the northbound roadway to just north of Mountain View Boulevard. At US 60, the northbound lanes would shift to the west to cross US 60 on the existing bridge. See Figure 10-14.

Interim A allows for a majority of the new construction to be used as part of the ultimate roadway thus dividing the cost of constructing the ultimate freeway between the near-term interim and the future ultimate. Interim A concept includes acquisition of all of the right-of-way that would be needed for the eventual construction of the ultimate freeway prior to building the interim roadway. The Interim A concept would utilize this right-of-way to slightly realign most of the cross streets. This realignment would permit the ultimate cross street grade separation to be built while traffic is maintained on the realigned street. This configuration would also avoid having to remove an interim intersection and replace it with a temporary signal and detour to construct the grade separation. This feature increases the cost of Interim A but reduces the cost to convert Interim A to the ultimate freeway.

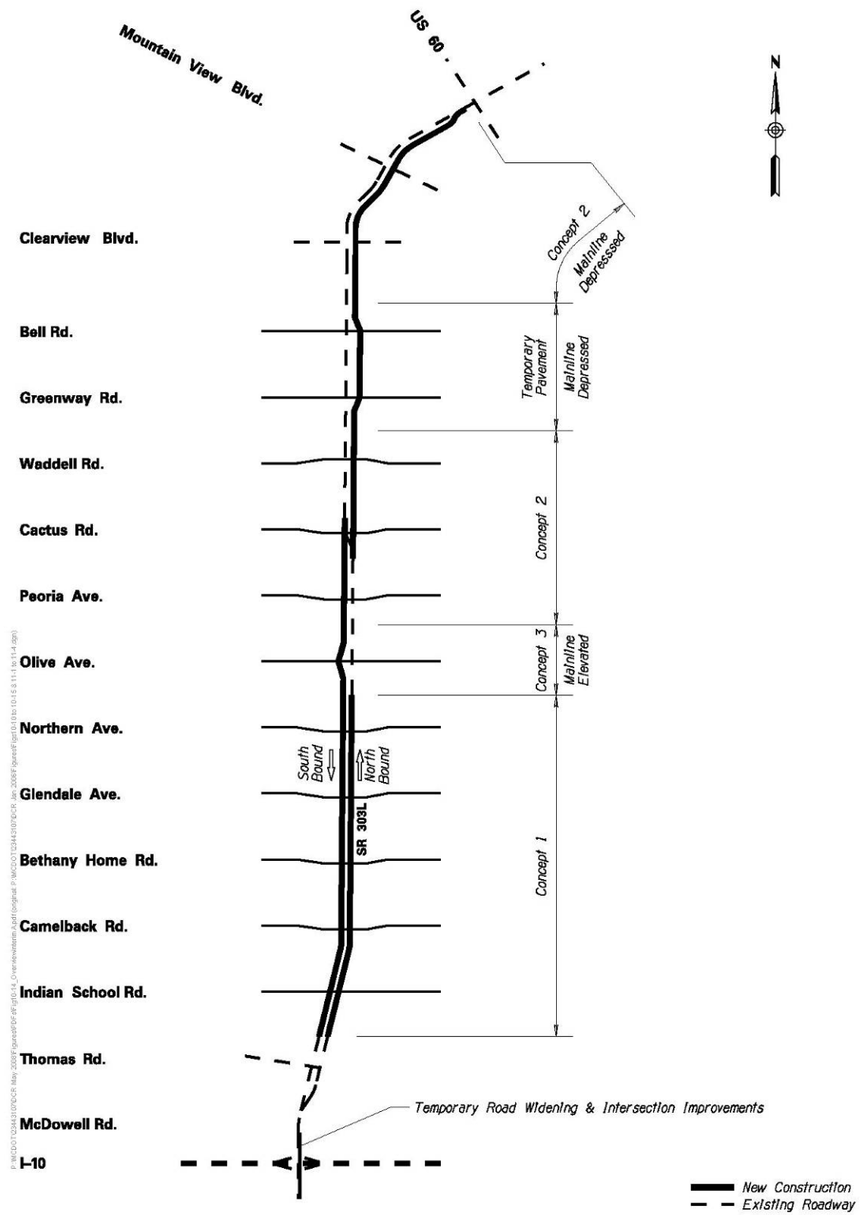


Figure 10-14 Overview of Interim A

The off-site drainage system described in Chapter 6 would have to be constructed with Interim A to protect the roadway. Similarly, the on-site (roadway) drainage structures and pipes for the interim would be constructed in there ultimate locations as much as possible. The ultimate roadway drainage system near Greenway Road would include a large-diameter storm drain trunk line to be constructed in the median in order to drain the low areas under Greenway Road and Bell Road. This trunk line would have to be built in the interim because the northbound lanes of SR 303L would be depressed north of Greenway Road (along the ultimate freeway grade) and would have to be drained. Obviously, the trunk line and any lateral pipes in this depressed area would be used in the ultimate freeway.

Irrigation channels, tailwater ponds and other irrigation facilities that conflict with the interim roadway or drainage improvements would have to be relocated to their ultimate locations in order to avoid moving them a second time when the ultimate freeway is constructed. Six existing wells conflict with the interim roadway configuration and would have to be relocated. Relocation of the remaining nine wells could be postponed, although it may be prudent to identify and acquire new well sites during the interim phase.

With Interim A, all intersections would be at-grade and signalized when warranted. Lighting would be provided at the intersections.

The four-lane divided interim SR 303L between Indian School Road and McDowell Road that was constructed in 2003 would continue to be used as the interim roadway. This roadway will be come throwaway when the freeway is constructed.

The Concept 1 section would increase the flexibility in staging the upgrading of the Interim A roadway. For example, if the next phase of construction includes constructing the grade separations at the cross streets and the ramps (without widening the mainline), a fully grade separated four-lane freeway would be provided with all components in the ultimate locations. The four-lane freeway may meet the needs of the corridor for many years. Two, four, or six lanes could be added in the median as needed.

Interim B

Interim B is a low-cost alternative to Interim A. Interim B consists of simply widening the existing pavement 12 feet on each side to accommodate four lanes of traffic, with left and right turn lanes at the intersections. The only wrinkle is that the current SR 303L just south of Clearview Boulevard runs between a privacy wall on the west and a well on the east. Guardrail is provided along the west edge of pavement to protect the wall. Therefore, all widening would have to occur along the east side of the pavement and additional guardrail would be needed to protect the well.

The Interim B concept includes opposing directions of traffic separated by a double yellow stripe: no median divider would be provided as with Interim A. The intersections would be signalized when warranted and lighting would be provided. Interim B would be designed to MCDOT standards, and no new construction would be usable for the ultimate construction. Minor additional right-of-way acquisitions would be needed to accommodate the interim widening for a left-turn lane at the intersections, but the cross streets would not be realigned to facilitate ultimate construction. This concept will create some traffic control and construction phasing challenges for converting Interim B to the ultimate freeway.

Culverts crossing the existing SR 303L would need to be extended to accommodate the pavement widening. Irrigation facilities would remain largely unchanged, since almost all improvements would occur within the existing right-of-way. No wells would have to be relocated.

Upgrading Interim B to the ultimate freeway presents significant challenges. The upgrade will probably occur when the four lanes constructed for Interim B are fully utilized. In many places along the corridor, there is insufficient space to maintain four lanes of traffic while constructing the new freeway. As a result, it may be necessary to close portions of SR 303L and detour traffic to Cotton Lane and/or Sarival Avenue. These roads would need to be upgraded to accommodate the additional traffic.

Where there is adequate space to maintain traffic on the Interim B roadway, one direction of new ultimate six-lane roadway would be constructed. During this phase, realignments (detours) for the cross streets would be constructed so that temporary intersections are provided with the new roadway. Both directions of traffic would be shifted to the newly constructed roadway while the other direction of travel is constructed. Likewise, traffic on the cross streets would be shifted to the detours and temporary intersections. The grade separations and interchange construction could then commence. Figure 10-15 shows the location of the Interim B roadway in relation to the ultimate freeway at various locations throughout the corridor.

This scenario would have high traffic control cost and high impact to motorists during construction.

10.10 OFF-SITE DRAINAGE SYSTEM ALTERNATIVES

As described in Chapter 6, the FCDMC has completed an update of the Loop 303 Corridor/White Tanks ADMP. This update was prompted by dramatic increases in population and other urban land use in the West Valley. The conversion of land from agriculture to residential land use creates different flood control strategies. There were two primary objectives to this ADMP Update. The first was to develop a plan to control runoff and prevent flood damage in the watershed. The second was to develop and implement a plan to manage the interim condition in which urban development occurs in a discontinuous pattern.

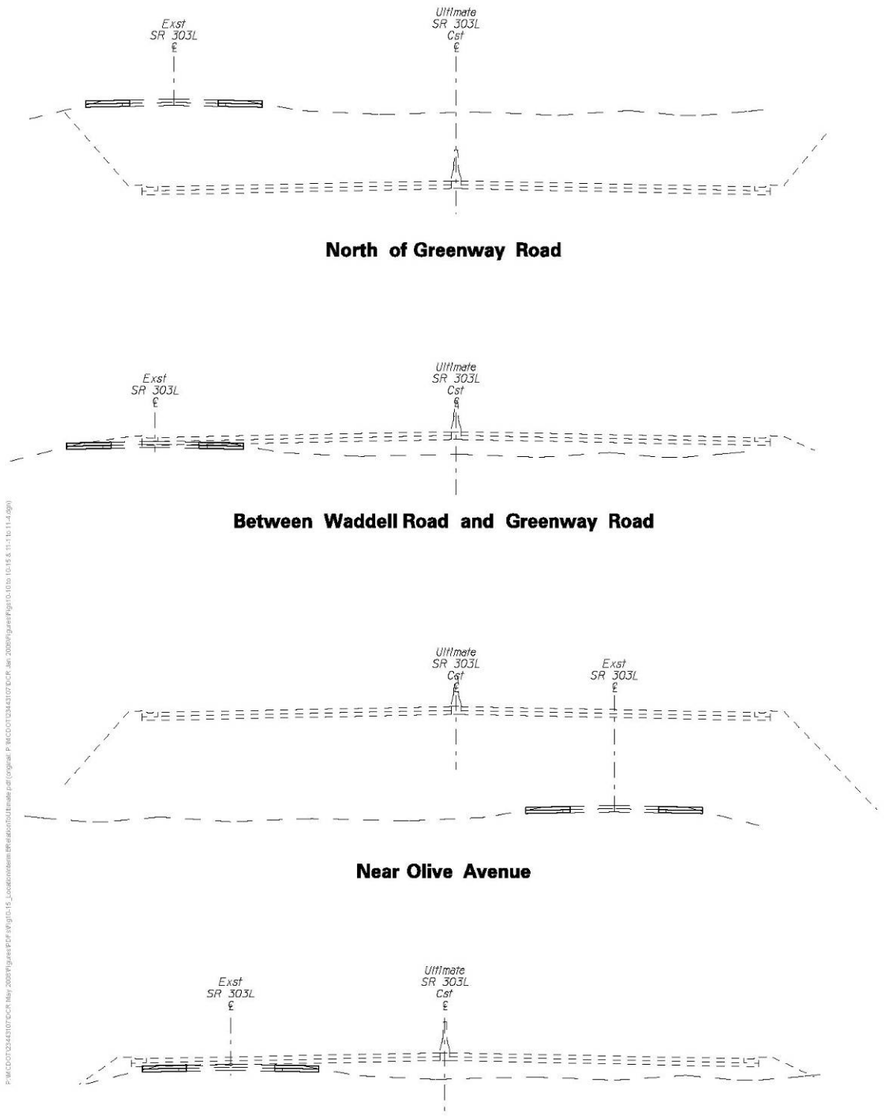


Figure 10-15 Location of Interim B in Relation to Ultimate

There have been a number of separate components in the updating process including data collection to estimate hydrology, the formulation and preliminary analysis of alternatives, and detailed analysis of preferred concepts. The preferred concepts include proposed improvements along the SR 303L corridor that specifically relate to the freeway itself.

A Level I Report was completed in May 2000, for the FCDMC. The report contained documentation of the methods and criteria used to develop and evaluate the preferred alternative solution.

As a result of public meetings, matrix evaluations, relative cost analysis, existing facility evaluations and other criteria, several alternatives were discarded during the Level I analysis. Three alternatives remained for further development evaluation. In the Level II portion of the project, further assessment of the three alternatives focused on location of channels, detention basins, and outfall within the study area. These alternatives were compared with a baseline alternative presented in the *Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum*, dated August 1998.

Each alternative was analyzed separately determining channel and basin sizes. The assessment went on to include evaluation of the overall effect on existing flood control facilities and basins along with the environmental impact. In addition, factors such as impact on utilities, land use, and proposed development were reviewed to determine the most desirable combination of channels and basins.

Finally, the results of the entire appraisal were provided in weighted matrices that were developed as a quantitative evaluation tool, from which a preferred alternative was recommended. For full details see the *Draft Phase II Alternatives Analysis Report Loop 303 Corridor/White Tanks Area Drainage Master Plan Update, Contract FC 99-40.*

The final level of analysis, Level III, was specific to the development of a 15% set of conceptual design plans and accompanying report based on the preferred alternative selected at the close of Level II. At this point in the process, the facilities proposed under the preferred alternative were more accurately located along their respective alignments and detailed profile information was developed for each. For final details, see the *Final Level III Loop 303 Corridor/White Tanks Area Drainage Master Plan Update, Contract FC 99-40, February 2005*.

By mutual agreement among the FCDMC, MCDOT, and ADOT, the basic concept for the off-site drainage system for SR 303L is proposed to be the system derived through the ADMP. This system is designed to meet FCDMC guidelines rather than ADOT guidelines. The FCDMC has agreed in principle to participate in the cost of the system, and a cost analysis has been prepared to provide guidance in the cost allocation.

10.11 EVALUATION OF ALTERNATIVE PROFILE AT INTERCHANGES

The development of the SR 303L profile in the Initial DCR prepared in April 2002 was predicated on the ability to construct an interim roadway without grade separations. The concept selected included construction of at least two permanent lanes of SR 303L at grade to serve one direction of travel. The existing two-lane interim roadway could be used for the other direction of travel in many places. In other places, the new interim roadway would consist of a new four-lane divided highway. During this interim stage, the cross roads would be aligned on temporary pavement along the edge of the ultimate right-of-way needed to accommodate embankment slopes for the future elevated cross road. At-grade temporary signalized intersections would be provided. As funding became available and the need was apparent, the cross roads would be constructed as elevated structures over SR 303L to form tight diamond service interchanges. This concept would minimize throw-away construction.

Both the City of Goodyear and the City of Surprise requested consideration of modification of the prior plan for SR 303L at a number of the interchanges. Through discussions with MCDOT and ADOT, it was agreed that the prior plan at Camelback, Bethany Home Road, Glendale Avenue, Northern Avenue, Peoria Avenue, Cactus Road, and Waddell Road should also be reviewed.

The proposed design changes were evaluated using four categories: earthwork, structures, right-of-way, and total cost. The proposed changes were assessed and presented in a Technical Memorandum provided in Appendix A and is summarized below.

- Right-of-Way – Less right-of-way would be needed to take the freeway over the cross streets than the cross streets over the freeway. In general, the decrease in the quantities was due to elimination of additional right-of-way along the cross streets.
- Structures – The cost of the structure to take the freeway over the street compared to the street over the freeway is generally $600,000 to $800,000 more per location. The cost varies with the width needed for the street. The cost comparison was based on the ultimate construction of ten lanes on SR 303L. If the streets were kept at grade, the structure needed to cross the drainage channel would be much shorter than the existing plan. As a result, cost would be reduced by approximately $500,000 to $700,000 per location. The net result is little difference in structures cost for freeway-over versus street-over.
- Earthwork – In general, elevating the SR 303L over at-grade streets would result in less earthwork than the previous plan, which had the streets elevated over the freeway. At Northern Avenue, elevating the freeway over Northern Avenue would result in more earthwork than the existing plan and the resulting increase in cost is approximately $2.5 million. Most of this increase is the result of the need to raise the profile of SR 303L approaching the Northern Parkway system interchange to meet ADOT design criteria. Meetings with the Wildlife World Zoo and AWC highlighted issues with land acquisition and possible relocation of an existing well and water lines. The extra cost of these items offset the added cost to the system interchange.
- Total Cost – The proposed plan to elevate SR 303L over Camelback Road, Bethany Home Road, Glendale Avenue, Peoria Avenue, Cactus Road and Waddell Road is estimated to save several hundred dollars per location in combined earthwork, structures, and right-of-way costs. In addition, the change in profile will simplify maintenance of traffic during construction. With the proposed plan, the streets would remain at grade and open to traffic (except for some short-term closures) during construction. The proposed plan at Northern Avenue to take SR 303L over Northern Avenue is estimated to cost over $700,000 more than the existing plan to take Northern Avenue over SR 303L. The additional cost is largely due to the effect the proposed plan has on the Northern Parkway system interchange.

Thomas Road was evaluated separately. The prior plan was to elevate SR 303L over Thomas Road in order to keep Thomas Road at grade and avoid impact on an existing SRP substation located west of the planned SR 303L.

The City of Goodyear on behalf of the Pebble Creek residential community located adjacent to the SR 303L corridor requested consideration of lowering SR 303L and raising Thomas Road. Due to the short distance between SR 303L and Cotton Lane, Thomas Road could not be fully elevated and still maintain the intersection with Cotton Lane.

Full depression of SR 303L would enable Thomas Road to remain at grade, but it would make it very difficult to gravity drain the SR 303L roadway. In addition, through meetings with APS, it was discovered that APS planned to replace the existing sub-station with a larger one located west of Cotton Lane. This discovery opened other options.

Partial elevation of Thomas Road and partial depression of SR 303L would enable Thomas Road to meet Cotton Lane, and SR 303L could be gravity drained. This configuration was satisfactory with the City of Goodyear and avoided other major concerns.

The depth of the SR 303L cut south of Thomas Road is variable. It could be made deeper if additional earthwork material is needed during the complex phased construction to be determined during the next phase of project development. A planned sewer line crossing SR 303L south of Thomas Road will also need to be considered in determining the optimum depth of this section.